

New *Protermes* from central Africa (Isoptera: Termitidae)

by

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Two new species of *Protermes* from central Africa are described, *P. mwekerae* and *P. minimus*. New records and additional descriptive notes are included for the three already known species, *P. hirticeps* Sjöstedt, *P. minutus* (Grassé), *P. prorepens* (Sjöstedt). A map illustrating the phytogeographic distribution of these five species is included.

DESCRIPTIONS

Protermes mwekerae spec. nov., figs 1, 2; map 1

IMAGO. Unknown.

SOLDIER. Head capsule light smoky brown, mandibles distally dark reddish brown to black, basal third smoky brown; postmentum same colour as ventral genae. Thoracic nota and abdominal tergites smoky yellow; abdominal colour between sclerites whitish. Legs concolorous with thoracic nota, but tibiae lighter than femora.

Head capsule in plan view broadly rectangular, sides straight to slightly convex, fontanelle not visible; in side view, upper and lower surfaces slightly but evenly convex, postmentum convex and protruding. Mandibles upcurved, tips slender, outer edge of right mandible evenly convex, that of left one slightly humped at level of second marginal tooth. In plan view sides of postmentum distinctly converging towards anterior end. Antennae 15-jointed, 1st segment the longest, 3rd shortest, 4th to 6th as wide as long, 7th to 15th ovoid and progressively increasing in size towards tip of antenna. Pilosity of head capsule conspicuous, but not dense. Anterior end of labrum ogival, without hyaline tip.

Pronotum half as wide as head capsule, saddle-shaped, anterior and posterior margins indented; metanotum distinctly wider than pronotum.

Measurements in millimetres: holotype, range, and mean from 67 specimens (type locality):—

	Holotype	Range	Mean
Head length (to external base of mandible)	1,25	1,20–1,33	1,27
Head maximum width	1,03	1,00–1,08	1,04
Head depth (including postmentum)	0,79	0,76–0,83	0,79
Postmentum length	0,83	0,80–0,86	0,84
Postmentum maximum width	0,54	0,51–0,56	0,54
Postmentum minimum width	0,48	0,45–0,50	0,49
Length of left mandible	0,65	0,60–0,68	0,65
Length of hind tibia	1,05	0,99–1,08	1,05
Pronotum maximum length	0,52	0,50–0,55	0,52
Pronotum width	0,82	0,79–0,86	0,83
Mesonotum width	0,80	0,78–0,85	0,81
Metanotum width	0,91	0,90–1,00	0,94

WORKER. *Major.* Head capsule reddish yellow, more densely pilose than that of soldier; in plan view with sides rather straight behind external articulations of mandibles. Postclypeus more than twice as wide as long, conspicuously inflated, hind margin convex, anterior margin concave. Antennae 17-jointed. Head width in 10 specimens: range 1,31–1,35, mean 1,32 mm.

Minor. Head capsule smoky yellow. Postclypeus more inflated than in major worker, less than twice as wide as long, hind margin convex, anterior margin straight. Antennae 15-jointed. Head width in 5 specimens: range 0,93–0,96, mean 0,94 mm.

COMPARISONS. This species is close both to *P. hirticeps* Sjöstedt and to *P. minutus* (Grassé), the measurements of which are given below. In the soldier caste, the average dimensions of *P. mwekerae* are between those of *P. minutus* and *P. hirticeps* (with considerable overlap); but the meso- and metanotum are wider in *P. mwekerae*, with the difference between metanotum width and pronotum width approximating 0,1 mm in all specimens (vs. 0,05 mm in both *P. hirticeps* and *P. minutus*). The two remaining species, *P. prorpens* (Sjöstedt) and *P. minimus* spec. nov., are distinctly smaller and can easily be separated by size alone from the other three.

Although the coloration is rarely a useful character in termites, it may be noted that both *P. hirticeps* and *P. minutus* seem to lack the smoky hue that appears in *P. mwekerae*.

Neither the shape of head and pronotum nor the pilosity of head capsule offer clear-cut specific characters, although the setae are generally more abundant on the head of *P. hirticeps* (fig. 1, A, B). The tip of the labrum is also more rounded in this species and in *P. minutus* than in *P. mwekerae*. In side view, the convexity of the head capsule is more pronounced in *P. mwekerae* than in the two other species (fig. 1, B). In ventral view, the sides of the postmentum are parallel in *P. hirticeps* and *P. minutus* (fig. 1, D); and their mandibles are stouter than those of *P. mwekerae* (fig. 1, C).

In the major worker of *P. mwekerae* the head in plan view has the sides behind the external articulations of the mandibles straight, in *P. hirticeps* these are convex; its postclypeus is much more strongly inflated than in *P. minutus*, and more than twice as wide as long as opposed to *P. hirticeps* where it is not wider than long.

MATERIAL EXAMINED. Type colony: ZAMBIA, 24 km ex Kitwe-Dola Hill via Mwekera Forest Reserve, 23.i.1957 (*W. G. H. Coaton*). Holotype soldier, morphotype workers, paratype soldiers and workers in National Collection of Insects, Pretoria (No. TM-3 957); other paratypes in British Museum (Nat. Hist.), London, American Museum of Natural History, New York, and Lovanium University, Kinshasa (R.D.C.).

DISTRIBUTION AND BIOLOGY. *P. mwekerae* is known only from the type locality (Map 1), situated in Northern *Brachystegia/Isoberlinia paniculata* woodland, as delimited by C. G. Trapnell *et al.* (1947).

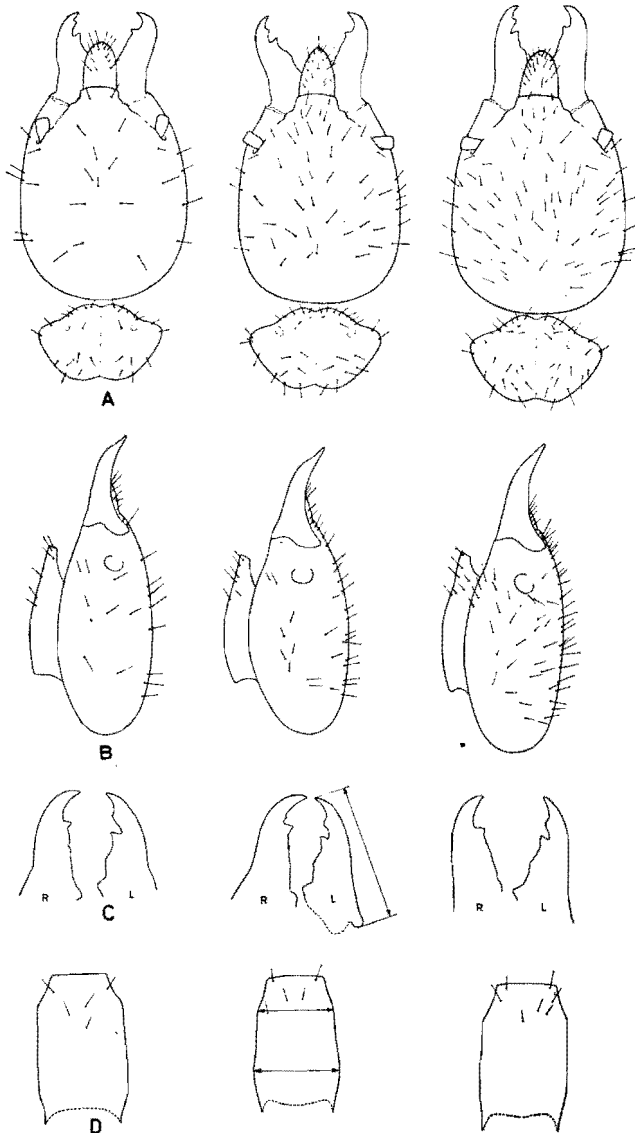


Fig. 1. Left to right: soldier of *Protermes minutus*, *P. mwekerae* and *P. hirticeps*. A: Head capsule, plan view; B: head capsule, side view; C: mandibles, ventral view; D: postmentum. (The arrows in C and D indicate the way in which the left mandible, the maximum and the minimum width of the postmentum are measured. Scale is arbitrary but identical for all head capsules.)

Surface nest structures of the colony, placed at the base of a tree, consisted of a low moundlet surmounted by six chimneys up to 28 cm tall, each of which enclosed a ventilating shaft. Some chimneys were entirely sealed off, in others the ventilating shafts debouched in laterally directed openings at the tip. No examination of internal nest structures was possible at the time. The mound was figured by Coaton (1962) and this sketch is reproduced here (fig. 2).

Coaton's notes indicate that a whitish sticky oral secretion is exuded abundantly by soldiers of *P. muvekeræ*; the insects taken when sampling the colony were found subsequently to be embedded in the vial in a solid gelatinous mass derived from such secretions. This would appear to be characteristic for the genus. It was observed by Kohl (in Emerson, 1928) and the present author (1966, unpublished) in the soldiers of *P. hirticeps*, and in *P. prorepens* by de Barros Machado (in Weidner, 1961).

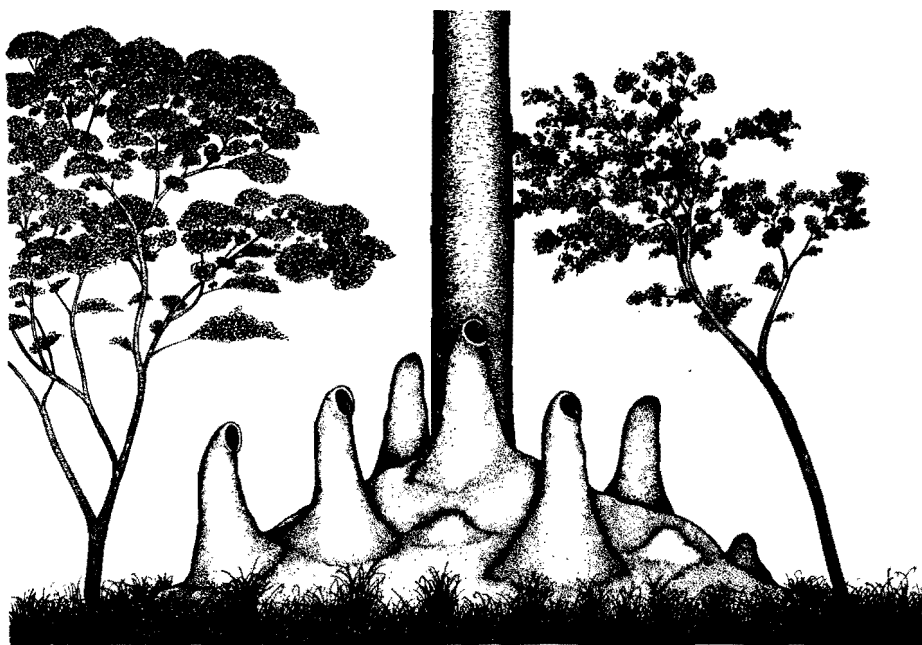


Fig. 2. Nest of *Protermes muvekeræ* (after Coaton, 1962).

Protermes hirticeps Sjöstedt, fig. 1; map 1

Protermes hirticeps Sjöstedt, 1924:495; 1926:148.

This species was described from Mukimbungu. It was subsequently recorded from Garamba and St. Gabriel near Stanleyville (now Kisangani), with supplementary description by Emerson (1928); and from Nalugwambala in the Garamba National Park by Harris (1963). These localities are all in the Congo (Kinshasa).

The present author has had available for examination (from localities recorded below) three additional samples; the following notes are based on 11 soldiers derived from these samples.

SOLDIER. Antennae 15-jointed, 3rd segment the shortest, as described by Sjöstedt (1926). In the material examined, there is thus no difference between *P. hirticeps* and *P. muvekeræ*. On the other hand, the pilosity of the head capsule is only slightly denser than in *P. muvekeræ*; and there is even a sample from Stanleyville, labelled as 'homotype' by A. Emerson (*in litt.*)—and undoubtedly nearer to *P. hirticeps* than to any other *Protermes*—but whose pilosity is even scarcer than that of *P. minimus* spec. nov. Hence the species-name '*hirticeps*' should not be taken as unequivocally descriptive.

Measurements in millimetres:—

	Range	Mean
Head length (to external base of mandible)	1,28–1,49	1,37
Head maximum width	1,08–1,16	1,11
Head depth (including postmentum)	0,79–0,95	0,84
Postmentum length	0,85–0,98	0,89
Postmentum maximum width	0,53–0,58	0,56
Postmentum minimum width	0,51–0,55	0,53
Length of left mandible	0,65–0,71	0,68
Length of hind tibia	1,01–1,18	1,10
Pronotum maximum length	0,50–0,55	0,52
Pronotum width	0,78–0,86	0,82
Mesonotum width	0,68–0,80	0,74
Metanotum width	0,81–0,93	0,87

Only the lower ranges of these measurements agree with the data provided by Emerson (1928).

MATERIAL EXAMINED. CONGO (Brazzaville): 13 km W. of Brazzaville, 8.vi. 1948 (A. Emerson), determined by A.E., sample exchanged with the N.C.I., Pretoria (No. TM-5819). CONGO: Mondongo, 16.ix.1966 (J. E. Ruelle), determined by J.E.R., on loan from Lovanium University, Kinshasa (No. VI 37) (used for illustration). UGANDA: Kinyanga (Bodongo Forest), 18.xii.1934 (H. Kirby); determined by A. Emerson, sample exchanged with the N.C.I. (No. TM-2004).

None of these localities has as yet been recorded in the literature.

DISTRIBUTION AND BIOLOGY. The sample taken at Mondongo, in secondary forest being cleared for cultivation, was obtained from a nest cavity (overall diameter about 80 cm) near the apex of an old massive (3 m high and 10 m basal diameter) mound of unknown origin, in which no other Macrotermitinae but two species of *Microtermes* could be found. The fungus combs of *P. hirticeps* had the same characteristics as those described by Grassé and Noirot in *P. minutus* and *P. prorsepens* (q.v.); they were saucer-shaped and lay horizontally in domed cavities, nested together in groups of two or three. Although that particular nest was searched for reproductive imagoes and yielded numerous larvae, no queen cell was observed.

The record from Nalugwambala, dated 29.ix.1950 and consisting of a single soldier (Harris, 1963:23) is accompanied by a picture of the surface structures over a nest of *P. hirticeps*, taken by H. De Saeger at Ndelela on 27.iii.1952 (*op. cit.* Pl. II, fig. 1). The grassland in the picture is somewhat unusual for a forest species. However, it is safe to anticipate further observations in assuming that *P. hirticeps* may indeed be less restricted to forests and gallery forests than would have been concluded from its other collecting localities.

Protermes minutus (Grassé), fig. 1; map 1

Termes minutus Grassé, 1937: 62.

This species was described from the low-altitude forest regions of the Ivory Coast near Abidjan, and subsequently recorded by Grassé et Noirot (1951) from

Danané and Dakpadou, in the same country. Two additional samples were available for this paper; they are recorded below.

SOLDIER. According to Grassé (1937), the antenna usually has 15 segments, but the 4th may be subdivided. Of the six soldiers from the Ivory Coast communicated by Prof. Noirot for this study, there were two with 14-, two with 15- and two with 16-jointed antennae. Such variability may be contrasted with the case of *P. muvekeræ*, where the number of antennal segments (15) was constant in every one of the 67 soldiers collected hitherto. However, even if this difference were specific, it could hardly be used for identification purposes with small samples.

The following measurements (in millimetres) have been taken on 9 specimens from 2 localities:—

	Range	Mean
Head length (to external base of mandible)	1,17–1,31	1,24
Head maximum width	0,95–1,06	1,00
Head depth (including postmentum)	0,75–0,80	0,77
Postmentum length	0,76–0,86	0,82
Postmentum maximum width	0,49–0,55	0,52
Postmentum minimum width	0,46–0,54	0,51
Length of left mandible	0,60–0,69	0,63
Length of hind tibia	0,93–1,06	1,00
Pronotum maximum length	0,45–0,51	0,49
Pronotum width	0,68–0,78	0,73
Mesonotum width	0,62–0,70	0,66
Metanotum width	0,72–0,83	0,78

The maximum width of the postmentum in this species is often nearer the middle of the segment than it is in either *P. hirticeps* or *P. muvekeræ*.

MATERIAL EXAMINED. IVORY COAST: 40 km N. of Agboville, forest, 29.xii.1960 (*C. Noirot*); determined by C. Noirot, on loan from private collection (No. TN 630). SIERRA LEONE: Fintonia, vi.1948 (*F. A. Squire*); determined by W. V. Harris, sample exchanged with the N.C.I., Pretoria (No. TM-6562).

BIOLOGY. The nest of *P. minutus* has been described and illustrated by Grassé (1937, 1944), Grassé et Noirot (1951). Its soldiers, like those of *P. hirticeps*, *P. muvekeræ*, *P. prorepens*, emit a whitish secretion when disturbed (Grassé, 1945:136).

***Protermes minimus* spec. nov., fig. 3; map 1**

IMAGO. Unknown.

SOLDIER. Head capsule yellow, mandibles reddish, with basal third yellow. Postmentum same colour as ventral genae. Thoracic nota and abdominal tergites a little lighter than head, with two darker spots on antero-lateral sides of pronotum; legs pale yellow.

Head capsule in plan view subrectangular, sides rounded and slightly converging towards anterior end; in side view with upper and lower surfaces evenly convex, gula protruding and its convexity parallel to that of ventral genae. Mandibles upcurved, in plan view curvature of outer edges very similar to that of *P. muvekeræ*; first marginal tooth of left mandible very small, second triangular, inner edge between second marginal and base not conspicuously serrated. Sides of postmentum apparently convex in plan view (owing to the bulging of this segment), but only very slightly tapering towards

anterior end. Antennae 14-jointed, 1st segment the longest, 2nd shorter than 1st and 3rd shorter than 2nd (in one specimen, 3rd as long as 2nd and showing signs of division), 4th the shortest, 5th as wide as long, 6th to 14th increasing in size. Fontanelle slit-like, inconspicuous (hardly visible in *P. mwekerae*).

Head capsule very sparsely pilose; labrum extending a little beyond basal half of mandibles, tip broadly rounded, bearing a few long setae.

Measurements in millimetres (3 specimens, type colony):—

	Holotype	Range
Head length (to external base of mandibles)	1,06	1,05–1,08
Head maximum width	0,85	0,85–0,86
Head depth (including postmentum)	0,67	0,65–0,67
Postmentum length	0,73	0,66–0,73
Postmentum maximum width	0,37	0,37–0,38
Length of left mandible	0,57	0,53–0,57
Length of hind tibia	0,76	0,76
Pronotum maximum length	0,42	0,40–0,42
Pronotum width	0,64	0,63–0,64
Mesonotum width	0,58	0,54–0,58
Metanotum width	0,68	0,65–0,68

WORKER. Major. Head capsule yellow, with two orange spots at lateral edges of post-clypeus, sparsely pilose; in plan view broadly U-shaped, with post-clypeus short (nearly three times as wide as long), middle half of hind margin straight, anterior margin concave, moderately inflated. Labrum long, extending beyond tips of closed mandibles. Antennae 16- to 17-jointed. Head width: 1,00–1,02 mm.

Minor. Similar to major worker, but paler and with post-clypeus more inflated. Head width: 0,75 mm.

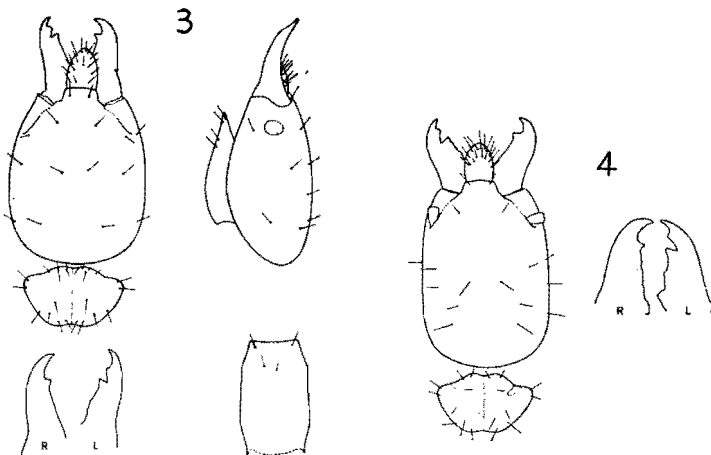


Fig. 3. *Protermes minimus*, soldier. Top row: head capsule, plan and side view; bottom row: mandibles and postmentum, ventral view. (Scale arbitrary).

Fig. 4. *Protermes prorepens*, soldier. Head capsule, plan view; mandibles, ventral view. (Scale arbitrary, but same as in fig. 3).

COMPARISONS. This species is close to *P. minutus* (Grassé), but its small size sets it wide apart. On the other hand, it cannot be mistaken for *P. prorepens* (Sjöstedt), which is characterised by a more rectangular head and stouter mandibles (fig. 4). In view of its habitat, it is actually closer to *P. mwekerae* and the possibility is not ruled out that *P. minimus* consists of nanitic forms from a juvenile colony of *P. mwekerae*. But only further sampling will tell (see note at end).

MATERIAL EXAMINED. CONGO: 40 km ex Kasongo-Lunda to Panzi road, 11.viii.1959 (J. E. Ruelle). Holotype soldier, morphotype workers, paratype soldier and workers in Lovanium University collection, Kinshasa (No. II 26); paratype soldier and paramorphotype major worker in N.C.I., Pretoria.

DISTRIBUTION AND BIOLOGY. The specimens on which the description is based were taken feeding on dead wood in *Brachystegia* woodland. Nesting habits are unknown.

Protermes prorepens (Sjöstedt), fig. 4; map 1

Eutermes prorepens Sjöstedt, 1907:244.

This species was described from Mukimbungu, in the Congo. It was further recorded from Avakubi, also in the Congo (Emerson, 1928:439), from Boukoko in the Central African Republic, Dakpadou near Gagnoa in the Ivory Coast (Grassé et Noirot, 1951:322, 323), the Bolo forest near Sassandra (Ivory Coast; Delachambre, 1965), and from Dundo, Angola (Weidner, 1961: 26).

The material available to the present author consisted of 6 nest series, from Mukimbungu and three other, as yet unrecorded, localities that are listed below.

SOLDIER. Additions to Sjöstedt's description have already been contributed by Emerson and Weidner. The following measurements (in millimetres) have been taken on 17 soldiers from the six afore-mentioned nest series:—

	Range	Mean
Head length (to external base of mandibles)	1,10–1,20	1,15
Head maximum width	0,80–0,85	0,82
Head depth (including postmentum)	0,51–0,68	0,63
Postmentum length	0,68–0,81	0,74
Postmentum maximum width	0,32–0,45	0,37
Length of left mandible	0,46–0,55	0,52
Length of hind tibia	0,66–0,73	0,69
Pronotum maximum length	0,33–0,40	0,37
Pronotum width	0,53–0,61	0,58
Mesonotum width	0,46–0,53	0,50
Metanotum width	0,56–0,64	0,60

The figures here agree closely with Emerson's measurements (1928). The number of antennal segments is 14, in accordance with Sjöstedt's and Emerson's observation.

Although the soldier mandibles have been accurately represented by Weidner (1961, fig. 8), the shape of the head, as figured there, seems less typical of *P. prorepens*, as portrayed here in fig. 4.

MATERIAL EXAMINED. CONGO: Mondongo. From this locality, three samples, all kept in the collections of the Lovanium University, Kinshasa, are recorded as follows: 13.ix.1966 (J. E. Ruelle), No. VI 09; 27.ix.1966 (collector unknown), No. VI 88; 30.ix.1966 (J. E. Ruelle), No. VI 112. Other series examined: Zobia-Nebasa (Bas-Uele),

1958 (*W. J. Pundell*), determined by *W. V. Harris*, sample exchanged with the National Collection of Insects, Pretoria (No. TM-6563); Camp Putnam, Epulu, 14.v.1948 (*A. Emerson*), determined by *A. E.*, exchanged with N.C.I. (No. TM-5817).

DISTRIBUTION AND BIOLOGY. The nest of *P. prореpens* has been described and illustrated by *Grassé et Noirot* (1951). During the course of a collecting trip made by the author in 1966 to the vicinity of Lisala (Congo) this species was taken on three occasions at Mondongo, which would seem to indicate that it may be fairly common in forest regions. Series No. VI 09 was collected from the external wall of a mound of *Macrotermes muelleri*, deep in secondary forest; No. VI 112 was taken in humid primary forest from a moss-grown mound about 60 cm high.

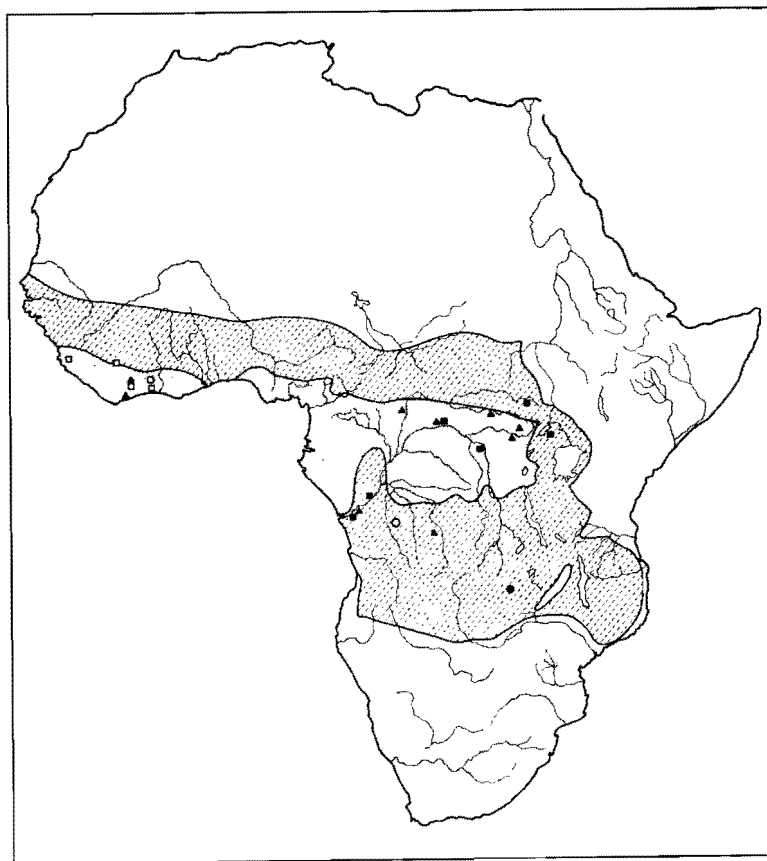
DISTRIBUTION OF *PROTERMES*

For convenience the localities from which *Protermes* have been collected to date are listed below in alphabetical order, with their co-ordinates and the species there recorded:

Abidjan	5° 19' N., 4° 01' W.	<i>P. minutus</i>
Agboville	5° 55' N., 4° 15' W.	<i>P. minutus</i>
Avakubi	1° 24' N., 27° 40' E.	<i>P. prореpens</i>
Boukoko	3° 50' N., 18° 00' E.	<i>P. prореpens</i>
Brazzaville	4° 14' S., 15° 14' E.	<i>P. hirticeps</i>
Danané	7° 21' N., 8° 10' W.	<i>P. minutus</i>
Dundo	7° 24' S., 20° 47' E.	<i>P. prореpens</i>
Epulu (Camp Putnam)	1° 23' N., 28° 30' E.	<i>P. prореpens</i>
Fintonia	± 8° 00' N., 12° 00' W.	<i>P. minutus</i>
Gagnoa (Dakpadou, near)	6° 04' N., 5° 55' W.	<i>P. minutus</i>
		<i>P. prореpens</i>
Garamba	± 4° 30' N., 29° 30' E.	<i>P. hirticeps</i>
Kasongo-Lunda	6° 30' S., 16° 51' E.	<i>P. minimus</i>
Kinyanga	1° 46' N., 31° 33' E.	<i>P. hirticeps</i>
Kitwe	12° 48' S., 28° 14' E.	<i>P. mwekerae</i>
Mondongo	2° 10' N., 21° 10' E.	<i>P. hirticeps</i>
		<i>P. prореpens</i>
Mukimbungu	5° 07' S., 14° 04' E.	<i>P. hirticeps</i>
		<i>P. prореpens</i>
Sassandra (Bolo forest, nr)	4° 58' N., 6° 08' W.	<i>P. prореpens</i>
Stanleyville (now Kisangani)	0° 33' N., 25° 14' E.	<i>P. hirticeps</i>
Zobia (Zobia-Nebasa)	2° 57' N., 25° 59' E.	<i>P. prореpens</i>

In Map 1 are delimited the main rain-forest vegetation zones of tropical Africa surrounded by zones of moist woodlands and savannas (after the vegetation map of Africa, Oxford, 1961). The picture is not as clear-out as portrayed since there are extensive intrusions of gallery forest into the woodlands mainly following the courses of rivers.

Distribution records of all known species of *Protermes* have been plotted on the map. The genus was hitherto recorded from zones of rain and gallery forest; now it appears that at least the newly described species, *P. mwekerae* and *P. minimus*, have a woodland distribution. *P. hirticeps* might also venture out of the forest, as illustrated by *Harris* (1963: Pl. II, Fig. 1; see discussion above). In any case further, extensive, collecting is needed to assess the complete phytogeographic range of the genus as well as the full infraspecific ranges of variation.



Map 1. Collecting localities of *Protermes*. Black circle: *P. mwekerae*; white circle: *P. minimus*; triangles: *P. prorepens*; black squares: *P. hirticeps*; white squares: *P. minutus*. The dotted area indicates the lowland forest vegetation zone (Oxford Vegetation Map No. 7); the striped one includes the moist woodlands and savannas (vegetation types 8-14, 16-19, 23, 24).

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NOTE: Three *Protermes* soldiers from Zambia were submitted for determination while this paper was going to press. They belong to *P. minimus*. The collecting data are: "Mbala to Kasama 65 km, foraging under a log, 23. xii. 1969, coll. M. G. Bingham." On Map I the locality would be near the southern tip of Lake Tanganyika.